WHAT IS CLAIMED IS:

1. A method of filtering an input signal containing wanted signal components and unwanted signal components, comprising:

modeling the input signal as a set of polynomials;

identifying polynomials from the set to model the unwanted signal components; and

removing the unwanted signal components from the input signal by removing the polynomials identified as modeling the unwanted signal components from the set of polynomials to thereby leave in the input signal only the wanted signal components.

2. A method as defined in claim 1, wherein the wanted signal components comprise a myoelectric signal and the unwanted signal components comprise at least one of the following disturbances: a cardiac signal, a motion disturbance, and background noise.

3. A method as defined in claim 1, wherein the wanted signal components comprise an ECG signal and the unwanted signal components comprise baseline variations.

4. A method as defined in claim 1, wherein the wanted signal components comprise internal variations of a QRS complex of an ECG signal and the unwanted signal components comprise a remaining part of the ECG signal.

5. A method as defined in claim 1, wherein modeling the input signal as a set of polynomials comprises:

considering an epoch *S(t)* of the input signal in a limited time interval, said epoch *S(t)* having a time scale; and

normalizing the time scale of the epoch *S(t)*.

6. A method as defined in claim 5, wherein normalizing the time scale of the epoch *S(t)* comprises:

shifting and scaling the limited time interval under consideration into a new variable $x$ in an interval $-1<x<1$ whereby the signal epoch becomes $S(x)$.

7. A method as defined in claim 1, wherein modeling the input signal as a set of polynomials comprises modeling the input signal as a set of orthogonal polynomials.

8. A method as defined in claim 6, wherein modeling the input signal as a set of polynomials comprises modeling the input signal as a set of orthogonal polynomials $Q_n(x)$.

9. A method as defined in claim 8, wherein the set of orthogonal polynomials $Q_n(x)$ comprises:

a first initial polynomial $Q_0(x)$ having a constant value; and

a second initial polynomial $Q_1(x)$ having a constant slope.

10. A method as defined in claim 7, comprising selecting the orthogonal polynomials from the group consisting of:

Legendre polynomials;

Tchebyshev T-polynomials; and

Tchebyshev U-polynomials.

11. A method as defined in claim 8, wherein modeling the input signal as a set of polynomials comprises:

expressing the input signal as a sum of the polynomials $Q_n(x)$:

$$S(x)=\sum_{n=0}^{P} C_n \; Q_n(x)$$

where $P$ represents a limited number of terms, and

$$C_n = \frac{1}{K_n} \int_{-1}^{+1} S(x) \; Q_n(x) \; f(x) \; dx$$

where $f(x)$ is a function of $x$ and $K_n$ is a constant depending on the order $n$.

12. A method as defined in claim 11, wherein identifying polynomials from the set

to model the unwanted signal components comprises:

associating particular orders of the polynomials with the unwanted signal components; and

modeling the unwanted signal components as a sum of the polynomials of said particular orders, comprising weighting the polynomials of said particular orders by means of the coefficients $C_n$.

13. A method as defined in claim 12, wherein removing the polynomials identified as modeling the unwanted signal components from the set of polynomials comprises:

removing the sum of weighted polynomials from the sum of polynomials $Q_n(x)$.

14. A method as defined in claim 1, wherein:

modeling the input signal as a set of polynomials comprises modeling the input signal as a sum of a limited number of polynomials; and

said method further comprises eliminating edge effects constituted by imperfections having a strength depending on the limited number of polynomials.

15. A method as defined in claim 14, wherein:

eliminating the edge effects comprises defining overlapping windows;

identifying polynomials from the set to model the unwanted signal components comprises identifying, in each window, polynomials from the set to model the unwanted signal components;

removing the unwanted signal components from the input signal comprises removing, in each window, the polynomials identified as modeling the unwanted signal components from the set of polynomials to thereby produce in said window a filtered signal part; and

eliminating edge effects further comprises:

in each window, weighting the filtered signal part to suppress the filtered signal part at opposite ends of the window and emphasize the filtered signal part in the central portion of said window; and

summing the weighted filtered signal parts of the overlapping windows to form an output filtered signal generally free from edge effects.

16. A method as defined in claim 15, wherein defining overlapping windows comprises:

defining 50% overlapping windows.

17. A method as defined in claim 15, wherein weighting the filtered signal part in each window comprises:

providing for each window an edge effect suppressing function; and

in each window, multiplying the filtered signal part by the edge effect suppressing function of said window.

18. A method as defined in claim 17, wherein providing for each window an edge effect suppressing function comprises:

constructing an edge effect suppressing function in such a manner that:

- a sum of the edge effect suppressing functions of the various overlapping windows is equal to unity; and
- a value of the edge suppressing function at opposite ends of each window is equal to zero.

19. A method as defined in claim 18, comprising selecting the edge effect suppressing functions of the overlapping windows from the group consisting of: a triangular function and a squared cosine function.

20. A method as defined in claim 1, wherein modeling the input signal as a set of polynomials comprises:

using higher order polynomials that mimic an oscillatory pattern of the input signal.

21. A device for filtering an input signal containing wanted signal components and unwanted signal components, comprising:

means for modeling the input signal as a set of polynomials;

means for identifying polynomials from the set to model the unwanted signal components; and

means for removing the unwanted signal components from the input signal,

wherein the unwanted signal components removing means comprises means for removing the polynomials identified as modeling the unwanted signal components from the set of polynomials to thereby leave in the input signal only the wanted signal components.

22. A device as defined in claim 21, wherein the input signal modeling means comprises:

means for considering an epoch $S(t)$ of the input signal in a limited time interval, said epoch $S(t)$ having a time scale; and

means for normalizing the time scale of the epoch $S(t)$, wherein said time scale normalizing means comprises means for shifting and scaling the limited time interval under consideration into a new variable $x$ in an interval $-1<x<1$ whereby the signal epoch becomes $S(x)$.

23. A device as defined in claim 22, wherein the input signal modeling means comprises:

means for modeling the input signal as a set of orthogonal polynomials $Q_n(x)$.

24. A device as defined in claim 23, wherein the set of orthogonal polynomials $Q_n(x)$ comprises:

a first initial polynomial $Q_0(x)$ having a constant value; and

a second initial polynomial $Q_1(x)$ having a constant slope.

25. A device as defined in claim 24, wherein the input signal modeling means comprises:

means for expressing the input signal as a sum of the polynomials $Q_n(x)$:

$$S(x)=\sum_{n=0}^{P} C_n \; Q_n(x)$$

where $P$ represents a limited number of terms, and

$$C_n = \frac{1}{K_n} \int_{-1}^{+1} S(x) \; Q_n(x) \; f(x) \; dx$$

where $f(x)$ is a function of $x$ and $K_n$ is a constant depending on the order $n$.

26. A device as defined in claim 25, wherein:

the input signal modeling means comprises means for modeling the input signal as a sum of a limited number of polynomials; and

said device further comprises means for eliminating edge effects constituted by imperfections having a strength depending on the limited number of polynomials.

27. A device as defined in claim 26, wherein:

the edge effects eliminating means comprises means for defining overlapping windows;

the polynomials identifying means comprises means for identifying, in each window, polynomials from the set to model the unwanted signal components;

the unwanted signal components removing means comprises means for removing, in each window, the polynomials identified as modeling the unwanted signal components from the set of polynomials to thereby produce in said window a filtered signal part; and

the edge effects eliminating means further comprises:

for each window, means for weighting the filtered signal part to suppress the filtered signal part at opposite ends of the window and emphasize the filtered signal part in the central portion of said window; and

means for summing the weighted filtered signal parts of the overlapping windows to form an output filtered signal generally free from edge effects.

28. A device as defined in claim 27, wherein the overlapping windows comprise 50% overlapping windows.

29. A device as defined in claim 27, wherein the filtered signal part weighting means comprises:

means for providing for each window an edge effect suppressing function; and

means for multiplying, in each window, the filtered signal part by the edge effect suppressing function of said window.

30. A method of filtering an input signal containing wanted signal components

and unwanted signal components, comprising:

modeling the input signal as a set of polynomials;

identifying polynomials from the set to model the wanted signal components; and

outputting the polynomials identified as modeling the wanted signal components as an estimate of the input signal substantially free from the unwanted signal components.

31. A method as defined in claim 30, wherein the wanted signal components comprise a myoelectric signal and the unwanted signal components comprise at least one of a cardiac signal, motion disturbance, and background noise.

32. A method as defined in claim 30, wherein the wanted signal components comprise an ECG signal and the unwanted signal components comprise baseline variations.

33. A method as defined in claim 30, wherein the wanted signal components comprise internal variations of a QRS complex of an ECG signal and the unwanted signal components comprise a remaining part of the ECG signal.

34. A method as defined in claim 30, wherein modeling the input signal as a set of polynomials comprises:

considering an epoch $S(t)$ of the signal in a limited time interval, said epoch $S(t)$ having a time scale; and

normalizing the time scale of the epoch $S(t)$.

35. A method as defined in claim 34, wherein normalizing the time scale of the epoch $S(t)$ comprises:

shifting and scaling the limited time interval under consideration into a new variable $x$ in an interval $-1<x<1$ whereby the signal epoch becomes $S(x)$.

36. A method as defined in claim 30, wherein modeling the input signal as a set of polynomials comprises modeling said input signal as a set of orthogonal polynomials.

37. A method as defined in claim 35, wherein modeling the input signal as a set of polynomials comprises modeling the input signal as a set of orthogonal polynomials $Q_n(x)$.

38. A method as defined in claim 37, wherein the set of orthogonal polynomials $Q_n(x)$ comprises:

a first initial polynomial $Q_0(x)$ having a constant value; and

a second initial polynomial $Q_1(x)$ having a constant slope.

39. A method as defined in claim 36, comprising selecting the orthogonal polynomials from the group consisting of:

Legendre polynomials;

Tchebyshev T-polynomials; and

Tchebyshev U-polynomials.

40. A method as defined in claim 37, wherein modeling the input signal as a set of polynomials comprises:

expressing the input signal as a sum of the polynomials $Q_n(x)$:

$$S(x)=\sum_{n=0}^{P} C_n \; Q_n(x)$$

where $P$ represents a limited number of terms, and

$$C_n = \frac{1}{K_n} \int_{-1}^{+1} S(x) \; Q_n(x) \; f(x) \; dx$$

where $f(x)$ is a function of $x$ and $K_n$ is a constant depending on the order $n$.

41. A method as defined in claim 30, wherein identifying polynomials from the set to model the wanted signal components comprises:

identifying orders of the polynomials of the set associated with the wanted signal components.

42. A method as defined in claim 30, further comprising weighting the polynomials identified as modeling the wanted signal components by means of

weighting coefficients.

43. A method as defined in claim 40, wherein identifying polynomials from the set to model the wanted signal components comprises:

associating particular orders of the polynomials with the wanted signal components; and

modeling the wanted signal components as a sum of the polynomials of said particular orders, comprising weighting the polynomials of said particular orders by means of the coefficients $C_n$.

44. A method as defined in claim 30, wherein modeling the input signal as a set of polynomials comprises:

using higher order polynomials that mimic an oscillatory pattern of the input signal.

45. A method as defined in claim 30, wherein:

modeling the input signal as a set of polynomials comprises modeling the input signal as a sum of a limited number of polynomials; and

said method further comprises eliminating edge effects constituted by imperfections having a strength depending on the limited number of polynomials.

46. A method as defined in claim 45, wherein:

eliminating the edge effects comprises defining overlapping windows;

identifying polynomials from the set to model the wanted signal components comprises identifying, in each window, polynomials from the set to model the wanted signal components;

outputting the polynomials identified as modeling the wanted signal components comprises outputting, for each window, the polynomials identified as modeling the wanted signal components to thereby produce in said window a filtered signal part; and eliminating the edge effects further comprises:

in each window, weighting the filtered signal part to suppress the filtered signal part at opposite ends of the window and emphasize the filtered signal part in the central part of said window; and

summing the weighted filtered signal parts of the overlapping windows to form an output filtered signal generally free from edge effects.

47. A method as defined in claim 46, wherein defining overlapping windows comprises:

defining 50% overlapping windows.

48. A method as defined in claim 46, wherein weighting the filtered signal part in each window comprises:

providing for each window an edge effect suppressing function; and

in each window, multiplying the filtered signal part by the edge effect suppressing function of said window.

49. A method as defined in claim 48, wherein providing for each window an edge effect suppressing function comprises:

constructing an edge effect suppressing function in such a manner that:

- a sum of the edge effect suppressing functions of the various overlapping windows is equal to unity; and
- a value of the edge suppressing function at opposite ends of each window is equal to zero.

50. A method as defined in claim 48, comprising selecting the edge effect suppressing functions of the overlapping windows from the group consisting of: a triangular function and a squared cosine function.

51. A device for filtering an input signal containing wanted signal components and unwanted signal components, comprising:

means for modeling the input signal as a set of polynomials;

means for identifying polynomials from the set to model the wanted signal components; and

means for outputting the polynomials identified as modeling the wanted signal components as an estimate of the input signal substantially free from the unwanted signal components.

52. A device as defined in claim 51, wherein the input signal modeling means comprises:

means for considering an epoch *S(t)* of the signal in a limited time interval, said epoch *S(t)* having a time scale; and

means for normalizing the time scale of the epoch *S(t)*, wherein said time scale normalizing means comprises means for shifting and scaling the limited time interval under consideration into a new variable *x* in an interval $-1<x<1$ whereby the signal epoch becomes *S(x)*.

53. A device as defined in claim 52, wherein the input signal modeling means comprises:

means for modeling said input signal as a set of orthogonal polynomials $Q_n(x)$.

54. A device as defined in claim 53, wherein the set of orthogonal polynomials $Q_n(x)$ comprises:

a first initial polynomial $Q_0(x)$ having a constant value; and

a second initial polynomial $Q_1(x)$ having a constant slope.

55. A device as defined in claim 54, wherein input signal modeling means comprises:

means for expressing the input signal as a sum of the polynomials $Q_n(x)$:

$$S(x)=\sum_{n=0}^{P} C_n \; Q_n(x)$$

where *P* represents a limited number of terms, and

$$C_n = \frac{1}{K_n} \int_{-1}^{+1} S(x) \; Q_n(x) \; f(x) \; dx$$

where *f(x)* is a function of *x* and $K_n$ is a constant depending on the order *n*.

56. A device as defined in claim 55, wherein:

the input signal modeling means comprises means for modeling the input signal as a sum of a limited number of polynomials; and

said device further comprises means for eliminating edge effects constituted by imperfections having a strength depending on the limited number of polynomials.

57. A device as defined in claim 56, wherein:

the edge effects eliminating means comprises means for defining overlapping windows;

the polynomials identifying means comprises means for identifying, in each window, polynomials from the set to model the wanted signal components;

the polynomials outputting means comprises means for outputting, for each window, the polynomials identified as modeling the wanted signal components to thereby produce in said window a filtered signal part; and

the edge effects eliminating means further comprises:

for each window, means for weighting the filtered signal part to suppress the filtered signal part at opposite ends of the window and emphasize the filtered signal part in a central portion of said window; and

means for summing the weighted filtered signal parts of the overlapping windows to form an output filtered signal generally free from edge effects.

58. A device as defined in claim 57, wherein the overlapping windows comprise 50% overlapping windows.

59. A device as defined in claim 57, wherein the filtered signal part weighting means comprises:

means for providing for each window an edge effect suppressing function; and

means for multiplying, in each window, the filtered signal part by the edge effect suppressing function of said window.

60. A method of filtering an input signal containing wanted signal components and unwanted signal components, comprising:

modeling the input signal as a set of polynomials;

determining, for each polynomial, a weighting coefficient indicative of signal strength; and

summing the weighting coefficients to provide an estimate of the strength of the

wanted signal components.

61. A method as defined in claim 60, wherein determining, for each polynomial, a weighting coefficient indicative of signal strength comprises:

modeling the strength of the wanted signal components through the weighting coefficients.

62. A method as defined in claim 60, wherein summing the weighting coefficients comprises:

summing the weighting coefficients on a square law basis with polynomial order weighting to give an estimate of a power of the wanted signal components.

63. A method as defined in claim 60, wherein summing the weighting coefficients comprises:

calculating a sum of the weighting coefficients on a square law basis with a weighting proportional to the number of oscillations for the order of the polynomial, normalized with respect to the sum of the weighting coefficients on a square law basis with polynomial order weighting, in order to obtain a dominating periodicity of the wanted signal components.

64. A method as defined in claim 60, wherein modeling the input signal as a set of polynomials comprises:

considering an epoch $S(t)$ of the input signal in a limited time interval, said epoch $S(t)$ having a time scale; and

normalizing the time scale of the epoch $S(t)$.

65. A method as defined in claim 64, wherein normalizing the time scale of the epoch $S(t)$ comprises:

shifting and scaling the limited time interval under consideration into a new variable $x$ in an interval $-1<x<1$ whereby the signal epoch becomes $S(x)$.

66. A method as defined in claim 65, wherein modeling the input signal as a set of polynomials comprises modeling the signal as a set of orthogonal polynomials $Q_n(x)$.

67. A method as defined in claim 66, comprising selecting the orthogonal polynomials from the group consisting of:

Legendre polynomials;

Tchebyshev T-polynomials; and

Tchebyshev U-polynomials.

68. A method as defined in claim 66, wherein modeling the input signal as a set of polynomials comprises:

expressing the input signal as a sum of the polynomials $Q_n(x)$:

$$S(x)=\sum_{n=0}^{P} C_n \; Q_n(x)$$

where $P$ represents a limited number of terms, and

$$C_n = \frac{1}{K_n} \int_{-1}^{+1} S(x) \; Q_n(x) \; f(x) \; dx$$

where $f(x)$ is a function of $x$ and $K_n$ is a constant depending on the order $n$,

wherein the terms $C_n$ constitute said weighting factors.

69. A device for filtering an input signal containing wanted signal components and unwanted signal components, comprising:

means for modeling the input signal as a set of polynomials;

means for determining, for each polynomial, a weighting factor indicative of signal strength; and

means for summing the weighting coefficients to provide an estimate of the strength of the wanted signal components.

70. A device as defined in claim 69, wherein the determining means comprises:

means for modeling the strength of the wanted signal components through the weighting coefficients.

71. A device as defined in claim 69, wherein the weighting coefficients summing means comprises:

means for summing the weighting coefficients on a square law basis with polynomial order weighting to give an estimate of a power of the wanted signal components.

72. A device as defined in claim 69, wherein the means for summing the weighting coefficients comprises:

means for calculating a sum of the weighting coefficients on a square law basis with a weighting proportional to the number of oscillations for the order of the polynomial, normalized with respect to the sum of the weighting coefficients on a square law basis with polynomial order weighting, in order to obtain a dominating periodicity of the wanted signal components.

73. A device as defined in claim 69, wherein the input signal modeling means comprises:

means for considering an epoch $S(t)$ of the input signal in a limited time interval, said epoch $S(t)$ having a time scale; and

means for normalizing the time scale of the epoch $S(t)$.

74. A device as defined in claim 73, wherein the time scale normalizing means comprises:

means for shifting and scaling the limited time interval under consideration into a new variable $x$ in an interval $-1<x<1$ whereby the signal epoch becomes $S(x)$.

75. A device as defined in claim 74, wherein the input signal modeling means comprises means for modeling the signal as a set of orthogonal polynomials $Q_n(x)$.

76. A device as defined in claim 75, wherein the input signal modeling means comprises:

means for expressing the input signal as a sum of the polynomials $Q_n(x)$:

$$S(x)=\sum_{n=0}^{P} C_n \; Q_n(x)$$

where $P$ represents a limited number of terms, and

$$C_n = \frac{1}{K_n} \int_{-1}^{+1} S(x) \; Q_n(x) \; f(x) \; dx$$

where $f(x)$ is a function of $x$ and $K_n$ is a constant depending on the order $n$,

wherein the terms $C_n$ constitute said weighting factors.